AMENDMENTS TO CLAIMS

1. (Canceled)

2. (Currently amended) The tilt sensor as claimed in claim [[1]] 64, wherein an order of the diffraction light received by said photo detector is that of a diffracted light of a greatest intensity.

3. (Currently amended) The tilt sensor as claimed in claim [[1]] 64, wherein said diffraction element is set so that the relation between the intensity of the diffraction light and the incident angle is substantially linear on a predetermined range of the incident angle.

4-63. (Canceled)

64. (Currently amended) [[The]] A tilt sensor ~~as claimed in claim 1,~~ for determining information related to a tilt of an object to a reference plane, comprising:

a diffraction element disposed at a position on an optical path of a light beam from the object, the light beam entering the diffraction element at an incident angle, the position of the diffraction element determined in accordance with a positional relation with the object, wherein the diffraction element diffracts diffraction light at a diffraction efficiency that varies in accordance with the incident angle of the light beam; and

a photo detector that receives the diffraction light diffracted by said diffraction element and outputs a photoelectric signal,

wherein the diffraction element has a Q-factor described by a first equation:

$$Q = 2\pi\lambda T/(nP^2) \geq .5,$$

wherein λ indicates a wavelength of an incident light, T indicates a groove depth of a grooved grating of the diffraction element, n indicates a refractive index of the diffraction element, and P indicates a groove pitch of the grooved grating of the diffraction element.

65. (Previously presented) The tilt sensor as claimed in claim 64, wherein the Q-factor of the diffraction element is further described by a second equation: $Q \geq 5$.

66. (Currently amended) The tilt sensor as claimed in claim [[1]] 64, wherein the diffraction element is a volume hologram.